PUBLIC NOTICE

Permit No. GP-40 Modification (2007-01915)
Issue Date: July 26, 2011
Expiration Date: August 25, 2011

US Army Corps
of Engineers
Kansas City District

30-Day Notice

JOINT PUBLIC NOTICE: This public notice is issued jointly with the Kansas Department of Health and Environment. The Department of Health and Environment will use the comments to this notice in deciding whether to grant Section 401 water quality certification. Commenters are requested to furnish a copy of their comments to the Kansas Department of Health and Environment, Bureau of Water - - Watershed Management Section, 1000 SW Jackson Street, Suite 420, Topeka, Kansas 66612-1367.

APPLICANT: General Public

PROJECT LOCATION: In all waters of the United States in the State of Kansas (including Indian Country within Kansas boundaries).

AUTHORITY: Section 404 of the Clean Water Act (33 USC 1344).

ACTIVITY: (PROPOSED) The proposed modification to GP-40 would add the Natural Resources Conservation Service (NRCS) conservation practices of Subsurface Drainage to address the severe gully erosion occurring in existing grassed waterways and other stable outlets built pre-1985. This authorization would be used in situations where the terrace outlets draining to waterways and the waterways themselves have silted full and are no longer functioning properly. When this happens the waterway cannot drain properly and it results in severe gully erosion within and adjacent to the waterway. As a result, the grassed waterway doesn't function properly and water quality is degraded in streams and wetlands from sediment, fertilizers and pesticides from croplands. This proposed modification of GP-40 would allow the use of the NRCS practices of subsurface drainage (Code 606, Attachment 1) and underground outlets (Code 620, Attachment 2) to rehabilitate or replace the non-functioning field drainage system. All outlets would be required to be treated by flowing though vegetative splash pads (Attachment 6, 7, & 8). The proposed modification would not change the overall project purpose of GP-40, which authorizes the discharge of dredged or fill material for NRCS agricultural conservation practices in waters of the United States within the state of Kansas.

WETLANDS/AQUATIC HABITAT: Because this is limited to existing grassed waterways that were built pre-1985, the National Food Security Act Manual (NFSAM) wetland label would be Prior Converted Cropland (PC) (NFSAM 514.30) and so no jurisdictional wetland would be impacted.

APPLICANT'S STATEMENT OF AVOIDANCE, MINIMIZATION, AND COMPENSATORY MITIGATION FOR UNAVOIDABLE IMPACTS TO AQUATIC RESOURCES: Mitigation measures include treatment of water flowing from cropland (see attachment 6, 7, & 8). Control of non-point pollution. Maintenance of ephemeral stream flows. Reduced sediment in streams and wetlands. Use of native plants for water filter and wildlife habitat. Kansas NRCS proposes to develop and use Minimal Effect Exemptions (Exemption) to meet requirements of Executive Order 11990, National Environmental Policy Act and Wetland Conservation Provisions of the NFSAM. The minimal effects determinations would limit the size of the drainage at the outlet to between 80 and 120 acres (Attachment 3, 4, & 5).

ADDITIONAL INFORMATION: Additional information about this application may be obtained by contacting **Luke M. Cory, U.S. Army Corps of Engineers, Kanopolis Regulatory Field Office, 107 Riverside Drive, Marquette, Kansas 67464 at telephone 785-546-2130 (FAX 785-546-2050) or via email at luke.m.cory@usace.army.mil**. All comments to this public notice should be directed to the above address.

CRITERIA FOR AUTHORIZATION: All activities authorized by this RGP (including this proposed modification) would require written pre-construction notification (PCN) to the Corps. Applications for Section 404 authorization under this RGP (GP-40) will be evaluated on a case-by-case basis. The Corps reserves the right to require an Individual Permit application in circumstances where the activity is determined to have more than a minimal adverse impact on the aquatic environment or when the proposed project does not meet the cited criteria.

COMPLIANCE WITH OTHER LAWS: All applicable statues, regulations, and administrative policies and agreements, including the National Environmental Policy Act of 1969 as amended, will be considered in the decision to issue this regional general permit.

ENDANGERED SPECIES: Projects eligible for authorization under this RGP may be located within the known range of Federally listed, threatened or endangered species. All projects located within the known range of any Federally listed species will require consultation with the U.S. Fish and Wildlife Service, pursuant Section 7 of the Endangered Species Act, to determine the potential effects on a particular species or its critical habitat. No activity is authorized under this RGP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

WATER QUALITY CERTIFICATION: Section 401 of the Clean Water Act (33 USC 1341) requires that all discharges of dredged or fill material must be certified by the appropriate state agency as complying with applicable effluent limitations and water quality standards. This public notice serves as an application to the state in which the discharge site is located for certification of the discharge. The discharge must be certified before a Department of the Army permit can be issued. Certification, if issued, expresses the state's opinion that the discharge will not violate applicable water quality standards.

PUBLIC INTEREST REVIEW: The decision to issue a permit will be based on an evaluation of the probable impact including the cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, esthetics, general environmental concerns, wetlands, cultural

values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and, in general, the needs and welfare of the people. The evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency under authority of Section 404(b) of the Clean Water Act (33 USC 1344). The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

COMMENTS: This notice is provided to outline details of the above-described activity so this District may consider all pertinent comments prior to determining if issuance of a permit would be in the public interest. Any interested party is invited to submit to this office written facts or objections relative to the activity on or before the public notice expiration date. Comments both favorable and unfavorable will be accepted and made a part of the record and will receive full consideration in determining whether it would be in the public interest to issue the Department of the Army permit. Copies of all comments, including names and addresses of commenters, may be provided to the applicant. Comments should be mailed to the address shown on page 2 of this public notice.

PUBLIC HEARING: Any person may request, in writing, prior to the expiration date of this public notice, that a public hearing be held to consider this application. Such requests shall state, with particularity, the reasons for holding a public hearing.

NOTE: This public notice is posted on the Kansas City District Regulatory web page and can be viewed at the following address:

http://www.nwk.usace.army.mil/regulatory/CurrentPN/currentnotices.htm

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

SUBSURFACE DRAIN

(Ft.)

CODE 606

DEFINITION

A conduit, such as corrugated plastic tubing, tile, or pipe, installed beneath the ground surface to collect and/or convey drainage water.

PURPOSE

- Improve the soil environment for vegetative growth, reduce erosion, and improve water quality by:
  1. Regulating water table and ground water flows,
  2. Intercepting and preventing water movement into a wet area,
  3. Relieving artesian pressures,
  4. Removing surface runoff,
  5. Leaching of saline and sodic soils,
  6. Serving as an outlet for other subsurface drains, and
  7. Regulating subirrigated areas or waste disposal areas.
- Collect ground water for beneficial uses.
- Remove water from heavy use areas, such as around buildings, roads, and play areas, and accomplish other physical improvements related to water removal.
- Regulate water to control health hazards caused by pests such as flukes, flies, or mosquitoes.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to areas having a high water table where the benefits of lowering the water table or controlling ground water or surface runoff justify installing such a system.

This standard applies to areas suitable for the intended use after installation of required drainage and other conservation practices. The soil shall have enough depth and permeability to permit installation of an effective and economically feasible system.

In areas where an outlet is available (either by gravity flow or by pumping), the outlet shall be adequate for the quantity and quality of effluent to be discharged.

CRITERIA

The design and installation shall be based on adequate surveys and investigations.

Capacity. One or more of the following shall determine the required capacity:

- Application of a locally tried and proven drainage coefficient to the acreage drained, including added capacity required to dispose of surface water entering through inlets.
- Yield of ground water based on the expected deep percolation of irrigation water from the overlying fields, including the leaching requirement.
- Comparison of the site with other similar sites where subsurface drain yields have been measured.
- Measurement of the rate of subsurface flow at the site during a period of adverse weather and ground water conditions.
- Application of Darcy's law to lateral or artesian subsurface flow.

NRCS, KS
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- Estimates of lateral or artesian subsurface flow.

Size. The size of subsurface drains shall be computed by applying Manning's formula. The size shall be based on the required capacity and computed by using one of the following assumptions:

- The hydraulic gradeline is parallel to the bottom grade of the subsurface drain with the conduit flowing full at design flow.
- The conduit flowing partly full where a steep grade or other conditions require excess capacity.
- Conduit flowing under pressure with hydraulic gradeline set by site conditions on a grade that differs from that of the subsurface drain. This procedure shall be used only if surface water inlets or nearness of the conduit to outlets with fixed water elevations permit satisfactory estimates of hydraulic pressure and flows under design conditions.

All subsurface drains shall have a nominal diameter that equals or exceeds 3 inches.

Depth, spacing, and location. The depth, spacing, and location of the subsurface drain shall be based on site conditions, including soils, topography, ground water conditions, crops, land use, outlets, and saline or sodic conditions.

The minimum depth of cover over subsurface drains in mineral soils shall be 2 feet. This minimum depth shall apply to normal field levels and may exclude sections of line near the outlet sections laid through minor depressions where the conduit is not subject to damage by frost action or equipment travel.

The minimum depth of cover in organic soils shall be 2.5 feet for normal field levels, as defined above, after initial subsidence. Structural measures shall be installed if it is feasible to control the water table level in organic soils within the optimum range of depths.

The maximum depth of cover for standard-duty corrugated plastic tubing shall be 10 feet for trench widths of 2 feet or less (depth measured at tubing and width measured to 1 foot above top of tubing). Heavy-duty tubing shall be specified for depths greater than 10 feet, trench widths more than 2 feet, or in rocky soils.

For computation of maximum allowable loads on subsurface drains, use the trench and bedding conditions specified and the crushing strength of the kind and class of drain. The design load on the conduit shall be based on a combination of equipment loads and trench loads. Equipment loads are based on the maximum expected wheel loads for the equipment to be used, the minimum height of cover over the conduit, and the trench width. Equipment loads on the conduit may be neglected when the depth of cover exceeds 6 feet. Trench loads are based on the type of backfill over the conduit, the width of the trench, and the unit weight of the backfill material. A safety factor of not less than 1.5 shall be used in computing the maximum allowable depth of cover for a particular type of conduit.

Minimum velocity and grade. In areas where sedimentation is not a hazard, the minimum grades shall be based on site conditions and a velocity of not less than 0.5 foot per second (ft/s). If a hazard exists, a velocity of not less than 1.4 ft/s shall be used to establish the minimum grades if site conditions permit. Otherwise, provisions shall be made for preventing sedimentation by using filters, by collecting and periodically removing sediment from installed traps, or by periodically cleaning the lines with high-pressure jetting systems or cleaning solutions.

Maximum velocity without protection. Design velocities shall not exceed those given in Table 1 unless special protective measures are installed to control piping of soil material into the drain.

Table 1 - Maximum velocities by soil texture

Soil Texture	Velocity (ft/s)
Sand and sandy loam	3.5
Silt and silt loam	5.0
Silty clay loam	6.0
Clay and clay loam	7.0
Coarse sand or gravel	9.0

Maximum grade and protection. On sites where topographic conditions require that drain lines be placed on steep grades and design velocities will be greater than indicated in

Table 1, special measures shall be used to protect the conduit or surrounding soil. These measures shall be specified for each job according to the particular conditions of the job site.

The protective measure shall include one or more of the following:

- Enclose continuous perforated pipe or tubing with fabric-type filter material or properly graded sand and gravel
- Use non-perforated continuous tubing, a watertight pipe, or seal joints
- Place the conduit in a sand and gravel envelope or blinding with the least erodible soil available
- Select rigid butt end pipe or tile with straight, smooth sections and square ends to obtain tight-fitting joints
- Wrap open joints of the pipe or tile with tar-impregnated paper, burlap, or special fabric-type filter material
- Install open-air risers for air release or entry

Iron ochre control. If drains are to be installed in sites where iron ochre and manganese dioxide problems are likely to occur, provisions should be made to provide access for cleaning the lines. Each drain line should outlet directly into an open ditch and/or should have entry ports as needed to provide access for cleaning equipment. Drain cleaning provisions should be installed in such a way that the drains can be cleaned in an upstream or rising grade direction. If possible, drains in ochre-prone areas should be installed during the dry season when the water table is low and the iron and manganese dioxide is in its insoluble form.

Where possible, in areas where the potential for such problems is high, protection against their development can be provided by designing an outlet facility to ensure permanent submergence of the drain line.

Protection against root clogging. Problems may occur where it is necessary to place drains in close proximity to perennial vegetation. Roots of water-loving trees (such as willow, cottonwood, elm, and soft maple) or some shrubs and grasses growing near subsurface drains may enter and obstruct the flow. Where possible, use non-perforated tubing or closed joints through the root zone area. Where this is not possible, water-loving trees should be removed from a distance of at least 100 feet on each side of the drain. A distance of 50 feet should be maintained from other species of trees except for fruit trees. Orchards can often be drained by drain lines located close to the fruit trees.

Where crops and grasses may cause trouble on drain lines, facilities may be installed to provide a means for submerging the line to terminate the root growth as desired or to maintain a water table above the drain lines to prevent growth into the system.

Materials. Subsurface drains include conduits of plastic, clay, concrete, bituminized fiber, metal, or other materials of acceptable quality.

The conduit shall meet strength and durability requirements for the site. All conduits shall meet or exceed the minimum requirements of the appropriate specifications published by the American Society for Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and the American Water Works Association (AWWA).

Foundation. If soft or yielding foundations are encountered, the lines shall be stabilized and protected from settlement by adding gravel or other suitable materials to the trench, by placing the conduit on a treated plank that will not readily decompose or on other rigid supports, or by using long sections or perforated or watertight pipe having adequate strength to ensure satisfactory subsurface drain performance. The use of a flat, treated plank is not recommended for corrugated plastic tubing.

Filters and filter material. Filters will be used around conduits, as needed, to prevent movement of the surrounding soil material into the conduit. The need for a filter will be determined by the characteristics of the surrounding soil material, site conditions, and the velocity of flow in the conduit. A suitable filter should be specified if one of the following occurs:

- Local experience indicates a need
- Soil materials surrounding the conduit are dispersed clays, silts with a plasticity index less than 7, or fine sands with a plasticity index less than 7

- Deep soil cracking is expected
- The method of installation may result in voids between the conduit and backfill material

If a sand-gravel filter is specified, the filter gradation shall be designed in accordance with Chapter 26, "Gradation Design of Sand and Gravel Filters," in National Engineering Handbook Part 633 (NEH 633), *Soil Engineering*.

Specified filter material must completely encase the conduit so that all openings are covered with at least 3 inches of filter material except that the top of the conduit and side filter material may be covered by a sheet of plastic or similar impervious material to reduce the quantity of filter material required. In all cases, the resulting flow pattern through filter material shall be a minimum of 3 inches.

Artificial fabric or mat-type filter materials may be used--provided that the effective opening size, strength, durability, and permeability are adequate to prevent soil movement into the drain throughout the expected life of the system.

Envelopes and envelope material. Envelopes shall be used around subsurface drains if they are needed for proper bedding of the conduit or to improve the characteristics of flow of ground water into the conduit.

Materials used for envelopes do not need to meet the gradation requirements of filters, but they must not contain materials that will cause an accumulation of sediment in the conduit or that will render the envelope unsuitable for bedding of the conduit.

Envelope materials shall consist of sand-gravel, organic, or similar materials. Sand-gravel envelope materials shall all pass a 1.5-inch sieve; not more than 30 percent shall pass a No. 60 sieve; and not more than 5 percent shall pass the No. 200 sieve. ASTM C 33 fine aggregate for concrete has been satisfactorily used and is readily available.

Where organic or other compressible materials are used, they shall be used only around a rigid wall conduit and above the centerline of flexible tubing. All organic or other compressible materials shall be of a type that will not readily decompose.

Placement and bedding. The conduit should not be placed on exposed rock or stones more than 1.5 inches in diameter for 6-inch or larger diameter tile. For less than 6-inch diameter tile, exposed stones shall be no more than ¾ inch in diameter. Where such conditions are present, the trench must be over-excavated a minimum of 6 inches and refilled to grade with a suitable bedding material.

The conduit must be placed on a firm foundation to ensure proper alignment. Prevent runoff and surface water from entering the trench.

If installation will be below a water table or where unstable soils are present, special equipment, installation procedures, or bedding materials may be needed. These special requirements may also be necessary to prevent soil movement into the drain or plugging of the envelope if installation will be made in such materials as quicksand or silt slurry.

For trench installations of corrugated plastic tubing 8 inches or less in diameter, one of the following bedding methods will be specified:

- A shaped groove or 90° V-notch in the bottom of the trench for tubing support and alignment
- A sand-gravel envelope, at least 3 inches thick, to provide support
- Compacted soil bedding material beside and to 3 inches above the tubing

For trench installations of corrugated plastic tubing larger than 8 inches, the same bedding requirements will be met except that a semi-circular or trapezoidal groove shaped to fit the conduit will be used rather than a V-shaped groove.

For rigid conduits installed in a trench, the same requirements will be met except that a groove or notch is not required.

All trench installations should be made when the soil profile is in its driest possible condition in order to minimize problems of trench stability, conduit alignment, and soil movement into the drain.

For trench installations where a sand-gravel or compacted bedding is not specified, the conduit should be blinded with selected material containing no hard objects larger than 1.5

inches in diameter. Blinding should be carried to a minimum of 3 inches above the conduit.

All installations shall meet the minimum requirements of the appropriate ASTM specification.

Auxiliary structures and protection. Structures installed in drain lines must not unduly impede the flow of water in the system. Their capacity must be no less than that of the line or lines feeding into or through them. The use of internal couplers for corrugated plastic tubing will be allowed.

If the drain system is to carry surface water flow, the capacity of the surface water inlet shall not be greater than the maximum design flow in the drain line or lines. Covers or trash racks should be used to ensure that no foreign materials are allowed in the drain lines.

The capacity of a relief well system will be based on the flow from the aquifer, the well spacing, and other site conditions and will be adequate to lower the artesian water head to the desired level.

The size of relief wells is generally based on the available materials rather than on hydraulic considerations. Such wells will not be less than 4 inches in diameter.

Junction boxes, manholes, catch basins, and sand traps must be accessible for maintenance. A clear opening of not less than 2 feet will be provided in either circular or rectangular structures.

The drain system must be protected against velocities exceeding those given in Table 1 and against turbulence created near outlets, surface inlets or similar structures. Continuous or closed-joint pipe must be used in drain lines adjoining the structure where excessive velocities will occur.

Junction boxes shall be installed where three or more lines join or if two lines join at different elevations. In some locations it may be desirable to bury junction boxes. A solid cover should be used, and the junction box should have a minimum of 1.5 feet of soil cover.

If not connected to a structure, the upper end of each subsurface drain line will be capped with a tight-fitting external cap of the same material as the conduit or other durable materials.

The outlet must be protected against erosion and undermining of the conduit, entry of tree roots, damaging periods of submergence, and entry of rodents or other animals into the subsurface drain. A continuous section of rigid pipe without open joints or perforations will be used at the outlet end of the line and must discharge above the normal elevation of low flow in the outlet ditch. Standard corrugated plastic tubing is not suitable for the outlet section. Minimize the visual impact of projecting outlets.

Continuously submerged outlets will be permitted for water table control systems if planned and designed according to the national Conservation Practice Standard 554, Drainage Water Management. Contact the Natural Resources Conservation Service for a copy of this national standard.

The outlet pipe and its installation will conform to the following requirements:

- If burning vegetation on the outlet ditch bank is likely to create a fire hazard, the material from which the outlet pipe is fabricated must be fire-resistant. If the likelihood is great, the outlet pipe must be fireproof.
- Two-thirds of the pipe will be buried in the ditch bank, and the cantilever section must extend to the toe of the ditch side slope or the side slope protected from erosion. The minimum length of the pipe will normally be 8 feet. Under certain conditions, shorter sections are appropriate (for example, steep-sided main and laterals of 1 horizontal to 1 vertical [1:1] or less) with a narrow bottom width of 3 feet (commonly referred to as “minimum ditches”) for outletting individual subsurface drain laterals. For conduits 10 inches in diameter and greater, longer outlet sections shall be considered, such as the following:
    1. Conduits 10 inches and 12 inches in diameter - Use 12 feet
    2. Conduits 15 inches and 18 inches in diameter - Use 16 feet
    3. All conduit diameters larger than 18 inches - Use 20 feet
- If ice or floating debris may damage the outlet pipe, the outlet shall be recessed to the extent that the cantilevered part of the

pipe will be protected from the current in the ditch.

- Headwalls used for subsurface drain outlets must be adequate in strength and design to avoid washouts and other failures.

Watertight conduits strong enough to withstand the expected loads will be used if subsurface drains cross under irrigation canals, ditches, or other structures. Conduits under roadways must be designed to withstand the expected loads. Shallow subsurface drains through depressed or low areas and near outlets must be protected from damage caused by farm machinery and other equipment and from freezing and thawing.

CONSIDERATIONS

When designing subsurface drainage systems, consider the effects the system will have on water quantity and quality.

Effects on quantity to consider include the following: water budget, base flow and runoff to water uses and users, ground water recharge, and volume of soil water needed to improve plant growth.

Water quality effects that should be considered include delivery of sediment, changes in the delivery of dissolved salts (such as nitrates) on downstream water uses and users, changes in delivery of dissolved substances to the aquifer, downstream water temperatures, and the effects on the visual quality of downstream water.

If there is a concern that tile lines will pick up polluted water from manure spreading, consider installing tile blocks, stoppable catch basins, or other temporary flow-blocking devices.

Consideration should be given to using subsurface drainage to control high water tables in areas where septic tanks and leach fields exist.

Consider adding collector mains to minimize the visual impact, to reduce the potential of ice or debris damage, and to facilitate maintenance of the grassed ditch bank.

The ability to drain and treat saline and sodic soils shall be considered where this is a problem. Most Kansas “saline seeps” are sodic-saline soils. Dropping a water table without adequate testing and gypsum application will generally cause the surface soil material to become more dispersed, thereby actually deteriorating soil quality

Consideration shall be given to possible damages above or below the point of discharge that might involve legal actions under federal, state, or local laws.

Consideration shall be given to maintaining or enhancing environmental values.

Considerations must be given to preventing adverse impacts to delineated wetlands regulated by state and federal regulations. In all cropland or potential cropland situations, a certified wetland determination shall be performed prior to drainage system design or planning.

PLANS AND SPECIFICATIONS

Plans and specifications for installing subsurface drains shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The plan will show accurate location and size of all the lines together with a profile of the mains and submains. Include typical bedding or envelope installations (if required). The plan shall also show location, control elevation, and pertinent features of junction boxes, drops, control gates, or other appurtenances that are a part of the drain facility.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed and reviewed with the landowner or individual responsible for operation and maintenance.

Subsurface drains shall be maintained by:

- Keeping junction boxes, drops, control gates, or other appurtenances clean and free of materials that can reduce the flow
- Repairing leaks and broken or crushed lines to ensure proper functioning of the lines
- Checking outlet conduit and animal guards to ensure proper functioning of the conduit
- Keeping adequate backfill over the conduit
- Repairing any eroded areas at the pipe outlet

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

UNDERGROUND OUTLET

(Ft.)

CODE 620

DEFINITION

A conduit installed beneath the surface of the ground to collect surface water and convey it to a suitable outlet.

PURPOSE

To dispose of excess water from terraces, diversions, subsurface drains, surface drains, trickle tubes, principal spillways from dams (outside the dam area only), or other concentrations without causing damage by erosion or flooding.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Excess surface water needs to be disposed of
- A buried outlet is needed for Conservation Practice Standards 362, Diversion; 600, Terrace; 350, Sediment Basin; 638, Water and Sediment Control Basin; or similar practices
- An underground outlet can be installed that will safely dispose of excess water
- Surface outlets are impractical because of stability problems, climatic conditions, land use, or equipment traffic

CRITERIA

General Criteria Applicable to All Purposes

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Capacity. The underground outlet shall be designed alone or in combination with other practices with adequate capacity to ensure the terrace, diversion, or other practice will function in accordance with the standard for that practice.

The outlet for terraces and diversions will have capacity to discharge the runoff from a 10-year frequency, 24-hour duration rainfall in 60 hours or less. Release rates will be determined by the procedure in the Kansas Supplement to Chapter 8 of National Engineering Handbook (NEH) Part 650, Engineering Field Handbook. The Storage Terrace Program (or equivalent) may be used and is found in the electronic Field Office Technical Guide (eFOTG), Section IV.

Inlet. An inlet may be a perforated riser, canopy inlet, or other appropriate device installed on the main conduit or offset to one side. The inlet shall be of durable material(s), structurally sound, and resistant to damage by rodents or other animals. If burning of vegetation is a hazard, the inlet shall be fire-resistant.

Perforated risers will be a minimum diameter of 4 inches. Minimum capacity shall be 1.2 times the release rate for the terrace or diversion. Intake holes shall be no smaller than 1 inch in diameter. See the Kansas Supplement to Chapter 8 of NEH Part 650, Engineering Field Handbook, or the Storage Terrace Program for capacity of perforated risers.

The discharge into the main conduit shall be controlled by an orifice located in the inlet. The orifice plate may be eliminated where full pipe flow is allowed in the main conduit.

Orifices used to control the discharge shall be round, smooth, and burr-free. Orifice plates will fit tightly against the seat to minimize leakage.

Access to the orifice, offset lateral, or main conduit shall be provided by a removable, durable cap on the top of the riser; a removable riser; or other approved means.

Flexible risers will be supported by a wood, metal, or plastic post capable of supporting the riser in an upright position. Risers made from rigid materials and set in the ground 2 or more feet need not have supporting posts but may require a marker post to indicate the riser location that can be seen from machinery.

Main conduit. The conduit shall have a minimum diameter of 3 inches. The conduit will be continuous, non-perforated pipe except that, when subsurface drainage is needed, a perforated conduit may be used outside the terrace or diversion ridge.

The maximum permissible velocity for perforated conduit shall be 3.5 feet per second for sand and sandy loam; 5 feet per second for silt and silt loam; and 7 feet per second for silty clay loam, clay, and clay loam.

Conduit capacity will be determined using a Manning's equation roughness coefficient "n" value as follows.

Pipe Material	Diameter (inches)	"n" Value
Smooth wall polyethylene (PE); smooth wall polyvinyl chloride (PVC); and corrugated PVC, smooth interior	all	.009
Smooth wall metal and dual wall corrugated PE, smooth interior	all	.012
Concrete	all	.013
Single wall corrugated PE pipe	3-6 8-10 12-15 18-24	.015 .017 .018 .020
Corrugated metal pipe annular helical	all 6-18 21-24	.025 .014 .017

Conduits shall be sized to carry the design flow with the hydraulic grade line parallel to the grade of the conduit and with the conduit flowing full or nearly full (non-pressure flow) except the outlet pipe below the bottom terrace may be designed for pressure flow providing corrugated plastic pipe or a perforated conduit is not used. See Chapter 3 of NEH Part 650, Engineering Field Handbook, or the Storage Terrace Program for discharge in circular pipes.

When the conduit size needs to be increased because of additional inflow volume or reduced grade, the change shall be made at or slightly upstream from the feature causing the increase. Joints shall be made with standard couplers recommended by the manufacturer and be hydraulically smooth. Fittings that reduce conduit area will not be used.

The conduit shall be buried to a depth where the dead load due to the backfill and the live load due to farm equipment will not overstress the pipe. The trench shall be wide enough to provide room for compaction around the conduit and a minimum of 8 inches wider than the pipe diameter. The conduit shall be bedded in a circular groove in the bottom of the trench shaped to fit the lower 120 degrees of circumference.

More than 1 conduit may be placed in a trench. The conduits shall be placed side by side with a minimum of 4 inches clearance between them.

Materials. Materials shall meet or exceed the design requirements against leakage and shall withstand internal pressure or vacuum and external loading. Plastic, concrete, aluminum, and steel shall meet the requirements specified in the applicable American Society for Testing and Materials (ASTM), American Association of State Highway Transportation Officials (AASHTO), or American Water Works Association (AWWA) standard listed in Table 1, "Fill height for pipe types." Conduits can be perforated or nonperforated, depending on the design requirements. A filter fabric wrap (sock) or equivalent shall be used if migration of soil particles around the conduit is anticipated.

Loading. The allowable loads on the conduits shall be based on the trench and bedding conditions specified for the job. Appropriate design procedures shall be used to determine the maximum allowable depth of cover for a particular type of conduit. Table 1 can be used where the stated conditions apply.

Table 1 - Fill height for pipe types

Pipe Type		Use	Fill Height Over Pipe	
Material	Reference Specification	Soil Type	Minimum (feet)	Maximum[1/] (feet)
Single wall corrugated PE pipe				
3" through 6" diameter	ASTM F 405	non-rocky	2	15[2/]
8" through 24" diameter	ASTM F 667	non-rocky	2	13[2/]
Dual wall corrugated PE pipe, smooth interior				
4" through 12" diameter	AASHTO M 252	non-rocky	2	11
15" through 30" diameter	AASHTO M 294	non-rocky	2	9
36" through 48" diameter	AASHTO M 294	non-rocky	2	8
Corrugated PVC pipe, smooth interior Pipe stiffness = 46				
4" through 36" diameter	ASTM F 949	non-rocky	2	11
Smooth wall PVC pipe, gasket or glue joints				
4" through 24" diameter, SDR 41	ASTM D 2241	any	2	6
4" through 15" diameter, SDR 35	ASTM D 3034	any	2	8
18" through 24" diameter, SDR 35	ASTM F 679	any	2	8
4" through 24" diameter, SDR 32.5	ASTM D 2241	any	2	9
4" through 18" diameter, SDR 26	ASTM D 2241	any	2	13
4" through 15" diameter, SDR 21	ASTM D 2241	any	2	18
4" through 12" diameter, DR 25	AWWA C 900	any	2	13
4" through 12" diameter, DR 18	AWWA C 900	any	2	22
14" through 24" diameter, DR 25	AWWA C 905	any	2	13
14" through 24" diameter, DR 18	AWWA C 905	any	2	22
Smooth wall iron or steel				
4" through 24" diameter, 3/16” minimum	ASTM A 53	any	2	19
Corrugated iron or steel				
4" through 48" diameter, 16-gauge minimum	ASTM A 760	any	2	25
Corrugated aluminum				
4" through 48" diameter, 16-gauge minimum	ASTM B 745	any	2	25

[1/] Based on NEH Part 636, Structural Engineering, Chapter 52 with values of E' = 200 psi, 7.5 percent deflection, a soil unit weight of 120 pcf, and a 10,000-pound wheel load for allowable deflection. For allowable buckling pressure, E = 140,000 psi

[2/] Indicates manufacturer’s recommendation for maximum fill over pipe.

Outlet. The outlet pipe shall be a rigid, non-perforated, smooth or corrugated, metal pipe with a minimum length of 10 feet. It shall be buried a minimum of 2 feet at the connection with the main conduit. Where fire or crushing hazard does not exist or other means of protection is installed, the metal outlet section is not required.

Animal guards shall be used on all drain outlets smaller than 15 inches in diameter. Outlets discharging into a waste storage pond or utilizing a canopy inlet do not require an animal guard. Each flap gate shall be an internal or external, gravity-closing, hinged gate with a loose pin that cannot rust tight.

Sufficient excavation and backsloping should be done around the outlet end of the main conduit and outlet channel to prevent any blockage of the outlet or the hinged gate by sloughing or siltation.

Visual resource design. All disturbed areas shall be reshaped and regraded to blend with the surrounding land features. Visual resources must be given the same consideration as other design features.

Vegetation. Areas not to be farmed shall be established to vegetation or protected from erosion by other means as soon as practicable after construction. Seedbed preparation, seeding, fertilizing, and mulching shall comply with Conservation Practice Standard 342, Critical Area Planting.

CONSIDERATIONS

Consider effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.

Consider effects on the volume of downstream flow that might cause undesirable environmental, social, or economic effects.

Evaluate potential use for water management.

Consider effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances that would be carried by runoff.

Consider effects on the visual quality of downstream water resources.

Consider the construction-related effects on the quality of downstream watercourses.

Consider effects on wetlands or water-related wildlife habitats.

Evaluate potential impact on water quality due to agri-chemicals in outflow.

Consider depth of underground outlet in regard to tillage equipment depth and maintenance, if applicable.

PLANS AND SPECIFICATIONS

Plans and specifications for installing underground outlets shall be in keeping with this standard and shall describe the requirements for installing the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

Underground outlets shall be maintained by:

- Keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce the flow
- Repairing leaks and broken or crushed lines to ensure proper functioning of the conduit
- Checking outlet conduit and animal guards to ensure proper functioning of the conduit
- Keeping adequate backfill over the conduit
- Repairing any eroded areas at the pipe outlet

KANSAS MINIMAL EFFECT EXEMPTION: KS-1 TERRACE SYSTEM CONVERSION FROM GRASSED WATERWAY/VEGETATED OUTLET TO UNDERGROUND OUTLET WORKSHEET

Landowner		**Tract**	
County		**Legal**	

	Yes	No
1) Were the terraces installed before December 23, 1985	☐	☐
2) Is the area in question dominated by wetland vegetation such as willow or cottonwood trees or reed canarygrass	☐	☐

If either 1 or 2 are No, the exemption does not apply

3) Does the area in question contain non-native grasses such as brome or fescue	☐	☐
4) Does the drainage area contribute to an impaired water body	☐	☐
If the answer to 4 is yes, list the impariment		
http://www.kdheks.gov/tmdl/index.htm		
If the answer to 4 is yes, have best management practices been considered to reduce the maximum pollutant load for the impairment	☐	☐

5) Exemption Calculation: Yes = 0.1, No = 0.3	**Yes**	**No**	**Actual**
a.) The area is an outlet for a terrace system	☐	☐	
b.) Gully erosion (classic or ephemeral) is occurring within or parallel to the grassed waterway/vegetated outlet	☐	☐	
c.) The grassed waterway/vegetated outlet is = or < 150 feet wide	☐	☐	
d.) Drainage area is = or < 80 acres	☐	☐	
e.) Grassed waterway/vegetated outlet grade is '= or > 3 percent	☐	☐	
Score	**0.0**		

If the score is 0.5 it Meets the exemption
If the score is 0.6 or more it Does Not meet the exemption

I certify the information in this Minimal Effect Exemption Worksheet

Signature		**Date**	

Has the CPA-52 been completed:	**Yes**	☐	**No**	☐

NOTE: **If questions 1 and 2 are answered yes, the area will be Prior Converted Cropland (reference National Food Security Act Manual, 514.30)**

NOTE: **If a terrace and underground outlet system is replacing a grassed waterway/vegetated outlet or manure is being applied to a crop field see Engineering Guidance Document for KS-1 Exemption and attachments**

pw: water

Attachment 3

KANSAS MINIMAL EFFECT EXEMPTION: KS-2 TERRACE SYSTEM UPGRADE FROM GRASSED WATERWAY/VEGETATED OUTLET TO A SHAPED GRASSED WATERWAY WITH SUBSURFACE DRAINAGE WORKSHEET

Landowner		**Tract**	
County		**Legal**	

	Yes	No
1) Were the terraces installed before December 23, 1985	☐	☐
2) Is the area in question dominated by wetland vegetation such as willow or cottonwood trees or reed canarygrass	☐	☐

If either 1 or 2 are No, the exemption does not apply

3) Does the area in question contain non-native grasses such as brome or fescue	☐	☐
4) Does the drainage area contribute to an impaired water body	☐	☐
If the answer to 4 is yes, list the impairment		
http://www.kdheks.gov/tmdl/index.htm		
If the answer to 4 is yes, have best management practices been considered to reduce the maximum pollutant load for the impairment	☐	☐

5) Exemption Calculation: Yes = 0.1, No = 0.3	**Yes**	**No**	**Actual**
a.) The area is an outlet for a terrace system	☐	☐	
b.) Gully erosion (classic or ephemeral) is occurring within or parallel to the grassed waterway/vegetated outlet	☐	☐	
c.) The grassed waterway/vegetated outlet is = or < 150 feet wide	☐	☐	
d.) Drainage area is '= or < 120 acres	☐	☐	
e.) Grassed waterway/vegetated outlet grade is '= or > 3 percent	☐	☐	
			0.0

If the score is 0.5 it Meets the exemption
If the score is 0.6 or more it Does Not meet the exemption

I certify the information in this Minimal Effect Exemption Worksheet.

Signature _____ **Date** _____

Has the CPA-52 been completed: **Yes** ☐ **No** ☐

NOTE: **If questions 1 and 2 are answered yes, the area will be Prior Converted Cropland (reference National Food Security Act Manual, 514.30)**

NOTE: **If manure is being applied to a crop field see Engineering Guidance Document for KS-1 and attachments**

pw: water

KANSAS MINIMAL EFFECT EXEMPTION: KS-3 TERRACE SYSTEM UPGRADE FROM GRASSED WATERWAY/VEGETATED OUTLET TO A SHAPED GRASSED WATERWAY WORKSHEET

Landowner		Tract	
County		Legal	

	Yes	No	
1) Were the terraces installed before December 23, 1985	☐	☐	
2) Is the area in question dominated by wetland vegetation such as willow or cottonwood trees or reed canarygrass	☐	☐	
If either 1 or 2 are No, the exemption does not apply			
3) Does the area in question contain non-native grasses such as brome or fescue	☐	☐	
4) Does the drainage area contribute to an impaired water body	☐	☐	
If the answer to 4 is yes, list the impairment http://www.kdheks.gov/tmdl/index.htm			
If the answer to 4 is yes, have best management practices been considered to reduce the maximum pollutant load for the impairment	☐	☐	
5) Exemption Calculation: Yes = 0.1, No = 0.3	Yes	No	
a.) The area is a grassed waterway/vegetated outlet for a terrace system	☐	☐	
b.) Gully erosion (classic or ephemeral) is occurring within or parallel to the grassed waterway/vegetated outlet	☐	☐	
			Actual
c.) The grassed waterway/vegetated outlet is = or < 150 feet wide	☐	☐	
d.) Drainage area is '= or < 120 acres	☐	☐	
e.) Grassed waterway/vegetated outlet grade is '= or > 0.6 percent	☐	☐	
	0.0		

If the score is 0.5 it Meets the exemption
If the score is 0.6 or more it Does Not meet the exemption

I certify the information in this Minimal Effect Exemption Worksheet

Signature _____ Date _____

Has the CPA-52 been completed: Yes ☐ No ☐

NOTE: If questions 1 and 2 are answered yes, the area will be Prior Converted Cropland (reference National Food Security Act Manual, 514.30)

NOTE: If manure is being applied to a crop field see Engineering Guidance Document for KS-1 Exemption and attachments

pw: water

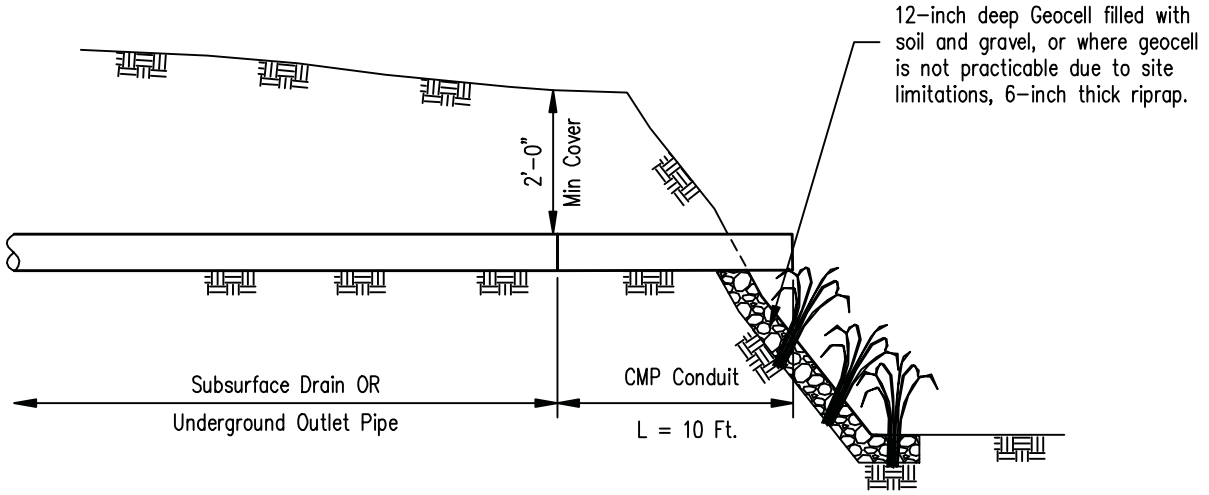
Engineering Guidance Document for KS-1 Exemption

1. The Underground Outlet will be designed to provide maximum retention time, limit the conveyance of pollutants, and minimize maintenance issues at the outlet due to sedimentation. A minimum detention of 8 hours is required for the design to provide these benefits.

2. The receiving area for the terrace outlet pipe shall be a vegetated waterway or vegetated buffer adjacent to streams or channels where possible. If the receiving area is an unvegetated channel due to the topography of the site, a vegetated splash pad will be constructed at the outlet pipe. The splash pad will be constructed as shown on the attached drawings.

3. When the application of animal waste is expected in the field controlled by the terraces and outlets, the waste must be applied according to an approved Nutrient Management Plan. In addition, a permanent vegetation buffer shall be considered between the application area and the inlet structure. A minimum radius of 35 feet from the inlet is recommended. Application of other agrochemicals may require a greater setback. Refer to label directions.

Vegetated Splash Pad on Channel Bank



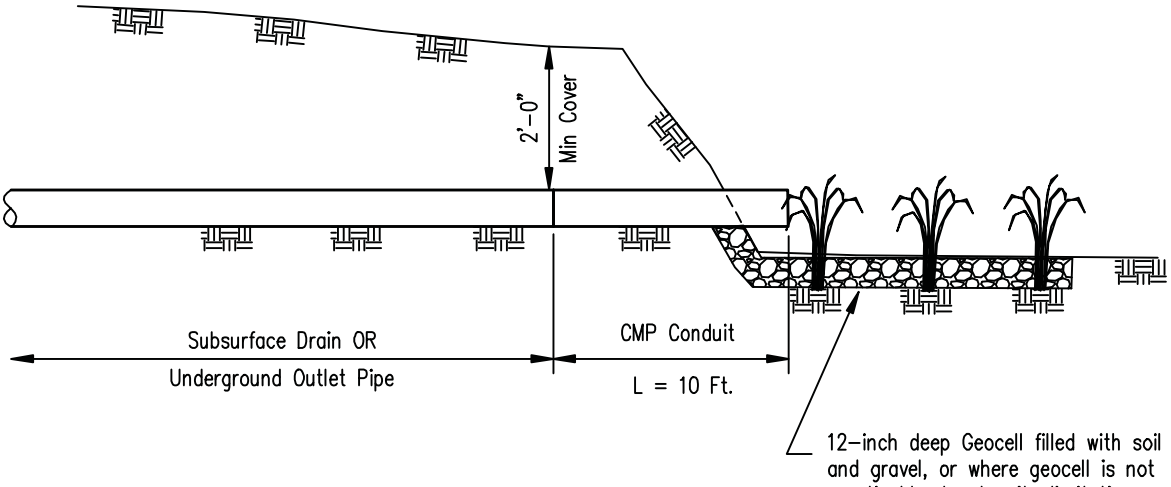
Note:
1. Plant vegetation prior to placing 6-inch riprap, if used.
2. The 12-inch geocell will be filled with 4" of soil material at the bottom and then filled to the top of the geocell with 3-inch gravel material.
3. Plant vegetation in soil material prior to placement of gravel material.
4. Minimum width of riprap or geocell will be 6 feet.

Sheet 1 of 1	Drawing No. KS-UTO-1	File No.	NRCS Natural Resources Conservation Service United States Department of Agriculture

VEGETATED SPLASH PAD DETAIL
Outlet on channel bank

Date
Designed
Drawn
Checked
Approved

Vegetated Splash Pad near Channel Bottom



Note:
1. Plant vegetation prior to placing 6–inch riprap, if used.
2. The 12–inch geocell will be filled with 4" of soil material at the bottom and then filled to the top of the geocell with 3–inch gravel material.
3. Plant vegetation in soil material prior to placement of gravel material.
4. Minimum width of riprap or geocell will be 6 feet.

Sheet 1 of 1	Drawing No. KS–UT0–2	File No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	VEGETATED SPLASH PAD DETAIL Outlet on channel bottom	Date Designed Drawn Checked Approved